

finger or another body part a pulse oximeter connected to a computerized or fuzzy logic control unit. When a pulse rate of a user drops to the lowest for this individual level a system will be switched on automatically and hypoxic conditions will be established for a time, necessary to increase user activity to desired level. A blood saturation with oxygen is also under constant control.

A big advantage of the invented system for this application is that it does not disturb a user and does not cause a "panic effect" which is genetically preset in humans if a part of the oxygen in the air is replaced by carbon dioxide. The system may be successfully used for hypoxic training of mammals as well.

What is claimed is:

Subj. Mat.

1. A system for providing a reduced-oxygen atmosphere to a user; said system comprising:
an oxygen-extraction device having an inlet intaking an intake gas mixture and first and second outlets, said first outlet transmitting a first gas mixture having a higher oxygen content than the intake gas mixture and said second outlet transmitting a second gas mixture having lower oxygen content than the intake gas mixture;
a breathing chamber having an internal space therein containing air, and an entry communicating with said internal space and through which the user can enter said internal space;
said second outlet communicating with said internal space and transmitting said second mixture to said internal space so that said second mixture mixes with the air in the internal space and
said first outlet transmitting said first mixture to a location wherein it does not mix with the air in the internal space.

- ab*
2. The invention according to claim 1 and
said inlet of said oxygen-extraction device communicating with said internal
space and taking the intake gas mixture from the air in said space.
3. The invention according to claim 1 and
said inlet of said oxygen-extraction device not communicating with said internal
space and taking the intake gas mixture from the air outside said space.
4. The invention according to claim 1 and
said internal space communicating with the atmosphere outside said breathing
chamber through vents in said chambers structure.
5. The invention according to claim 4 and
said vents having valves for creating pressure difference between the air inside
said internal space and atmosphere outside said internal space.
6. A system for providing a low-oxygen environment for a user
comprising:
 a chamber comprising a door and wall structure defining a closed space
 into which the user can enter through the door, said door being selectively
 closable so that when closed, the chamber is substantially isolated from the
 outside environment;
 a gas processing device having an intake and first and second outlets,
 said device intaking a gas mixture through said intake and emitting a reduced
 oxygen gas mixture having a lower concentration of oxygen than said gas
 mixture through said first outlet and enriched-oxygen gas mixture having a

02
greater concentration of oxygen than said gas mixture through said second outlet;

said first outlet being connected with said chamber so that the reduced-oxygen gas mixture is emitted into said closed space inside the chamber;

said chamber having apertures in the wall structure thereof allowing communication therethrough of air in the outside environment with air in the chamber, said apertures being substantially the sole communication between the closed space and the outside environment when the door is closed;

said gas processing device comprising a pump receiving the gas mixture from the inlet and a separation unit with a reduced oxygen mixture conduit and an enriched oxygen mixture conduit,

said first outlet being operatively associated with said reduced oxygen mixture conduit and receiving said reduced oxygen gas mixture therefrom, said second outlet being operatively associated with said enriched oxygen mixture conduit and receiving said enriched oxygen gas mixture therefrom and releasing said mixture to a location removed from said chamber and said apertures.

7. The invention according to claim 6 and
said separation unit comprising housing defining a space therein and having a separating membrane block supported in said housing and dividing the space into a retentate space and a permeate space,
said pump pumping said gas mixture across said membrane block and separating it into oxygen enriched permeate being disposed outside said chamber and oxygen depleted retentate being released inside said chamber.

- 02
8. The invention according to claim 6 and
said separation unit comprising a pressure swing adsorption device employing
molecular sieve material which adsorbs nitrogen from the intaking gas mixture
being compressed by said pump whereby the remaining oxygen concentrate is
discharged outside said chamber and the nitrogen concentrate being recovered
through the depressurization of the nitrogen-saturated molecular sieve material
and is released into said chamber.
9. The invention according to claim 6 and
said separation unit comprising a pressure swing adsorption device employing
molecular sieve material which adsorbs oxygen from the intaking gas mixture
being compressed by said pump whereby the remaining nitrogen concentrate is
released into said chamber and the oxygen concentrate being recovered through
the depressurization of the oxygen-saturated molecular sieve material and is
disposed outside the system.
10. The invention according to claim 6 and
said intake being connected with said closed space inside the chamber so that
the gas mixture is drawn from the air in the chamber.
11. The invention according to claim 6 and
said intake not communicating with said chamber so that the gas mixture outside
the chamber is drawn for separation.
12. The invention according to claim 6 and
said apertures providing openings of at least 2 square centimeters in said wall
structure.

*A²
Concl.*

13. The invention according to claim 10 and
said apertures providing openings for reinstating atmospheric pressure inside
said chamber being located in upper portion of the chamber.

14. The invention according to claim 11 and
said apertures providing openings for equalizing atmospheric pressure inside
said chamber being located in lower portion of the chamber.

15. The invention according to claim 6 and
said chamber is a structure inside means of transportation selected from the
group consisting of: motor vehicles, airplanes and helicopters, space ships,
ships and submarines;
said system used for hypoxic training, fighting sleepiness and drowsiness and
increasing attentiveness of operators of said means of transportation.

16. The invention according to claim 6 and
said chamber is a structure selected from the group consisting of commercial,
medical, physical training, recreational, residential, educational and
entertainment rooms and structures;
said system used for hypoxic training and therapy.

17. A system for hypoxic training and therapy simulating an oxygen-depleted mountain air of different altitudes, said system comprising:
a closed space inside a structure having a door and ventilating openings;
an oxygen content-reducing device separating ambient air into an oxygen concentrate and a nitrogen concentrate;

*Sub
A³*

*3
cont.*

said oxygen content-reducing device having a nitrogen concentrate outlet communicating with said closed space and supplying air reduced in oxygen content, a gas inlet receiving air for separation, and an oxygen concentrate outlet not communicating with said closed space;

a control unit to control and regulate the performance of said oxygen content-reducing device;

an oxygen content sensor with oxygen depletion alarm for monitoring oxygen content level inside said closed space communicating with said control unit;

18. The invention according to claim 17 and said system having humidity and temperature control unit for regulating humidity and temperature of the air inside said closed space.

19. The invention according to claim 17 and said system having a pulse oximeter for monitoring users pulse rate and blood saturation with oxygen.
said oximeter transmitting data to said control unit for computerized processing and regulating oxygen content level inside said closed space in accordance to users condition.

20. The invention according to claim 17 and said system having physical exercise equipment inside said closed space, said system used for hypoxic training of humans and mammals in order to increase their strength, vitality and resistance to various diseases.

*Sub
a⁴*

21. The invention according to claim 17 and said system being equipment for hypoxic therapy and used for preventive therapy and treatment of cardiopulmonary, gastrointestinal, gynecological, allergy, neurological, skin and ocular diseases and illnesses treatable through activating of immune system of organism.

*add
a⁵*

22. The invention according to claim 17 and said closed space is a space inside an entire building or structure, and said oxygen content-reducing device is incorporated into air-conditioning system of said building or structure using the systems ventilation ducts and equipment for delivery hypoxic gas mixture.